REMARKS

Support for the amendments to claims 8 and 14 can be found, for example, in previously presented claim 4. Support for new claim 29 can be found, for example, in previously presented claims 8, 27 and 2. Support for new claim 30 can be found, for example, in the specification on page 9 at line 20, on page 10 at line 20, on page 11 at lines 3-5 and on page 11 at line 10. No new matter has been added.

Rejections under 35 U.S.C. §103

Claims 14 and 16 stand rejected as allegedly being obvious over Yamazaki (US 6,133,119) in view of Ichinose (US 5,688,366), Skorupski et al (US2002/0162218) and Klein (DE10101926).

Claims 2-4, 6-8, 10-12, 19-24 and 26-28 stand rejected as allegedly being obvious over Skorupski et al (US2002/0162218) in view of Klein (DE10101923). Claim 25 stands rejected as allegedly being obvious over Skorupski et al in view of Klein and further in view of Ohlsen (US 6,641,948).

The goal of of Yamazaki, Ichinose and Skrupski is to texture/roughen/structure a surface.

Yamazaki teaches an alkali etching process conducted on a silicon substrate with NaOH to produce a textured uneven structure. See FIG. 2A. The concentration of the alkaline etchant changes as the etching reaction is carried out. The object of Yamazaki is to form a surface so that solar light is scattered to make a longer optical path length, thereby being capable of efficiently absorbing the solar light. Etching profiles measured on etched surfaces, which are treated with compositions according to the Yamasaki show serrated lines.

In contrast to the anisotrophic etching behavior of Yamazaki, the present invention etches surface material in an isotrophic manner allowing a precise etch in all directions within the crystal lattice structure of the substrate surface. Figure 1 (attached), depicts a silicon surface which has been rough etched on the left side

and the right side has been etched with a paste according to the present invention. The topography of the right side is significantly smoother than the left side.

Likewise, Ichinose etches transparent conductive film (SnO_2, InO_3, ITO) and teaches that irregular light reflection occur at the surface and the surface may be textured so that the surface has proper irregularities. The same is true of Skrupski who roughens the surfaces of metal foils to produce a surface structure having peaks and valleys which produce roughness parameters wherein the average roughness (Ra) ranges from about 1 to about 10 microns and the average peak to valley height (Rz) ranges from about 2 to about 10 microns. The precise and controlled depth of etching is not a consideration for any of the references. In contrast, this invention etches silicon surfaces and achieves selective etching to depths of 1- 3 µm and the narrow etching range results in fine even lines with smooth bottoms.

Thus, even if the Examiner's proposed modifications of the prior art would lead a skilled worker to the present invention, that would render the prior art being modified unsatisfactory for its intended purpose (i.e., surface roughening). Thus, there is no suggestion or motivation to combine. See *In re Gordon*, 733 F.2d 900 (Fed. Cir. 1984).

In any event, the combined prior art does not result in the present invention. Applicants have previously submitted data comparing the present invention with etching compositions which are representative of the prior art. In response to the Examiners comments of page 2 and 3 of the Advisory Action the attached Exhibit contains additional examples which are within the bounds of the presently claimed invention (i.e., Examples 6-10 and 13-14) and comparative Examples 11 and 12. Furthermore, with regards to the representative examples from the prior art, the Examiner is relying on the combination of individual elements from prior art references and although evidence of unexpected results must compare the claimed invention with the closest prior art, applicant is not required to compare the claimed invention with subject matter that does not exist in the prior art. *In re Geiger*, 815 F.2d 686, 689, 2 USPQ2d 1276, 1279 (Fed. Cir. 1987).

A skilled worker would recognize that an etchant must be adapted to the surface which it will etch. The method of the present invention is carried out using a thickened composition, the diffusion mechanism of the etchant in a thickened, thixotropic solution is entirely different from that in a liquid composition; not only are the etching results entirely different but in order to achieve good results the medium has to be activated by the input of energy. The activation by the input of energy (e.g., increased temperature) is a consideration in the formulation of the etchant composition. As depicted in Figure 2 (attached), the behavior of an etching paste is dependent upon the interaction of numerous parameters. Acidic etchants with added thickeners (such as Klein) and alkaline etchants with added thickener behave differently, particularly in response to the input of energy. In addition, it can not be concluded that an alkaline thickened etchant will provide the same long term storage stability as that of an acid thickened composition. Furthermore, the rheological properties of a thickened acidic etchant and a thickened alkaline etchant are different. Moreover, the proposed modification of Yamazaki with the particulate thickeners of Ichinose would alter the diffusion mechanism of the Yamazaki etchant. A skilled worker would expect that altering the diffusion mechanism would render it unsatisfactory for its intended purpose of roughening the surface to form rough and uneven textures.

Ichinose offers no way to overcome the deficiencies of Yamazaki. Ichinose is silent regarding the etching of silicon surfaces such as those used by Yamazaki and employs an acid etchant with a completely different reactive chemistry from that of Yamazaki.

Thus, a skilled worker would not have combined the teaching of Yamazaki with Ichinose. Neither reference teaches or suggests an etching medium that is printable according to the present invention or suitable for the selective etching of fine lines to depths of 1-3 µm. Nor do they teach or suggest compositions comprising a mixture of solvents (i.e., water and at least one of the different organic solvents) for achieving this purpose. The Examiner is suggesting that a skilled worker would combine two references each of which teach an etchant to form uneven and rough surface texture. Thus, the proposed modification to these etchant compositions to conform to the claimed invention would make them unsuitable for their intended

purpose. Moreover, the combined teachings do not meet all of the elements of the claimed invention.

The Examiner relies upon Skorupski for teaching NaOH etching mediums possessing between 8 and 16%wt NaOH. Skorupski teaches the manufacture of printed circuit boards having improved interlayer adhesion and generally teaches a skilled worker how to roughen the surfaces of metal foils, not silicon surfaces. The physical properties of silicon and polyimide are entirely different and a skilled worker would not look to an etchant for polyimide to etch silicon (see Example 27). Substrates are chemically etched by running them through a solution (see Example 7). Like Yamazaki, the etching mediums of Skorupski roughen the substrate surfaces in order to achieve a better adhesion of interlayers. Also like Yamazaki and Ichinose, Skorupski does not teach or suggest a mixture of solvents (i.e., water and at least one other organic solvent). Moreover, the etching mediums of Skorupski are not printable and do not provide selective etching to a depth of 1-3 µm.

As can be seen in the declaration submitted on 2 October 2009, even at elevated temperatures the composition of Skorupski resulted in very weak etching depths of 0.3 µm. Furthermore, the compositions of Skorupski do not result in enhanced silicon edge isolation, which is an advantage of the process of the present invention. Thus, unlike the present invention, any subsequent metal deposition will not be optimal and the circuit lines cannot be carried out properly. As noted above, a homogeneous and even depth of etch is very important for the subsequent deposition of metallic circuits into the etched lines.

Even if a skilled worker were to use the NaOH etchant of Yamazaki and Skorupski in a thickened form they would still not achieve selective etching. The Examiner relies upon Klein (DE10101926) for teaching the addition of a thickener for making an etching solution a paste (see page 4 of English translation). Klein does not cure the deficiencies of the above discussed references. The rheological properties of a thickened acidic etchant and a thickened alkaline etchant are different. Klein uses fluoride based etchants (e.g., fluoride, bifluoride or tetrafluoroborate as etchants) optionally in combination with mineral acids and/or organic acids. In addition, Klein's compositions contain a buffer like lactat or H_3PO_4.

On page 3 of the translation, Klein teaches numerous individual solvents and classes of solvents and states that they may be mixtures. Klein does not provide any specific examples with a mixture of water with another solvent. There is nothing which would lead a skilled worker to choose from among the 36 specific solvents listed or any of the hundreds of possible solvents from among the classes of solvents to arrive at a specific mixture of water with another solvent.

As noted in the previously submitted declaration, Klein only achieves an etching depth of 0.12 µm. In addition, as noted in the attachment, the viscosity of the Klein paste could not be increased enough to reach 25Pas, which a skilled worker would expect in order to achieve high resolution printing. Klein does not teach or suggest the selective etching of silicon surfaces to a depth of 1-3 µm. A skilled worker would not look to Klein to modify the teachings of the other references because Klein discloses etching solutions for entirely different surface chemistries with entirely different active ingredients.

Ohlsen (US 6,641,948) discloses the application of a photoresist layer to protect areas from the subsequent application of an aqueous 30 % KOH solution. Ohlsen is silent regarding a printable etching paste. An aqueous etching solution is not comparable with the printable compositions of the present application. Ohlsen does not cure the deficiencies of Skorupski or the other references. None of the references teach or suggest a printable thickened etching paste having a mixture of solvents comprising water and at least one other organic solvent. Furthermore, they are silent regarding exposure times and do not achieve the recited line depths.

The method of the present invention is carried out using a thickened composition. The diffusion mechanism of the etchant in a thickened, thixotropic solution is entirely different from that in a liquid composition, not only are the etching results entirely different but in order to achieve good results the activating temperature has to be different as well. Furthermore, the etching process consumes significantly reduced amount of etching chemicals since the etching paste is only applied to the areas to be etched.

In determining whether references can be combined, their teachings as a whole must be considered. In this case, the Examiner picks elements from numerous individual references and combines them together. All of the cited references disclose different etching compositions for different applications. Furthermore, there is nothing within the cited references which would guide a skilled worker which elements of the prior art compositions to leave out in order to arrive at an etching composition that would provide selective etching to a depth of 1-3 µm. Applicants submit that if one condition or ingredient changes the whole composition must be adapted, particularly if one is trying to achieve a specific homogenous etching depth. Clearly, appellants' disclosure is impermissibly being used as a template to assert obviousness. See. e.g., *In re Fritch* 972 F.2d 1260, 23 USPQ2d 1780 (Fed. Cir. 1992) where the court stated:

Consequently, Applicants respectfully submit that there is insufficient motivation to combine the teachings of the cited references, and these rejections should be withdrawn.

Thus, based on the above remarks it is respectfully requested that the rejection under 35 U.S.C. §103 be withdrawn.

No fee is believed to be due with this response, however, the Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,

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